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(71) Applicant

Gifford Henry Langley  
GHL Products, Lodge Farm, Hankelow, Crewe,  
CW3 0JE, United Kingdom

(72) Inventor

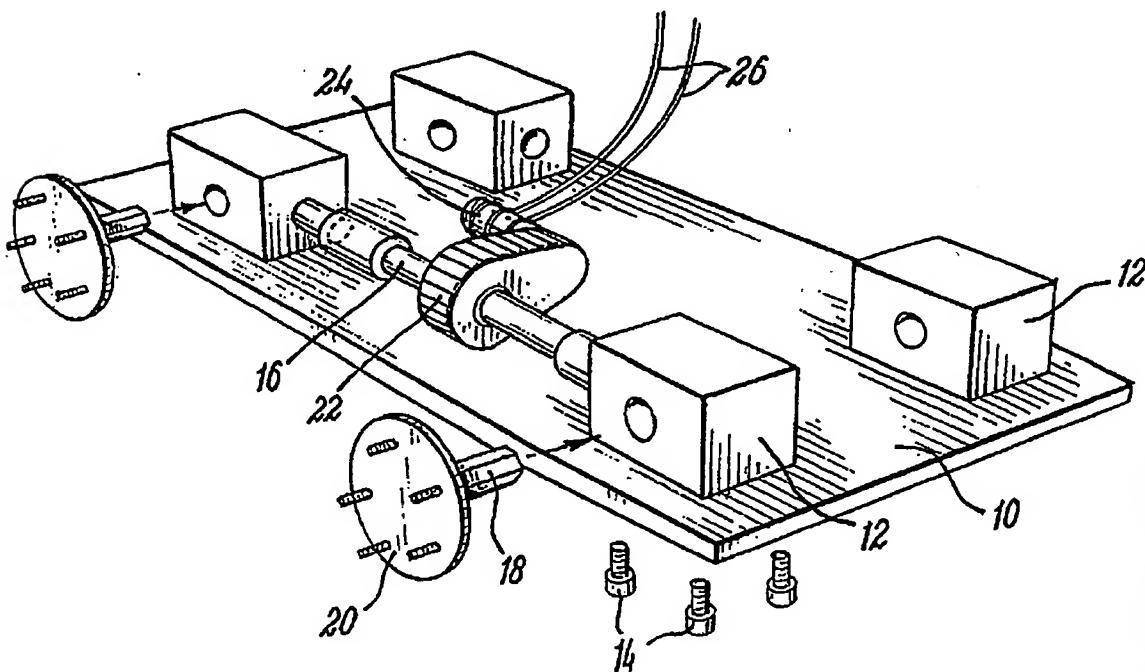
Gifford Henry Langley

(74) Agent and/or Address for Service

Swindell & Pearson  
48 Friar Gate, Derby, DE1 1GY, United Kingdom

## (54) Skid steer vehicle

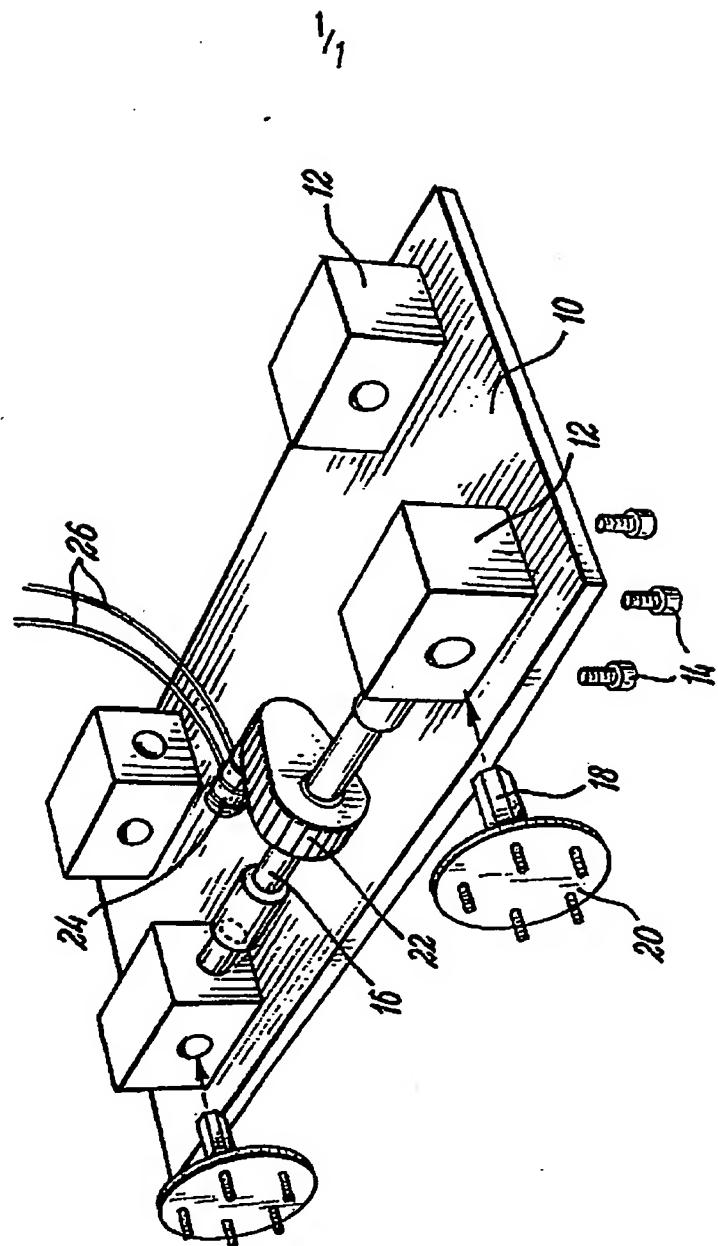
(57) A skid steer vehicle includes a base plate 10. Mounted one towards each respective corner of the plate 10 are bevel gear boxes 12. A drive shaft 16 engagingly extends between the respective gear boxes 12 on each side of the plate 10. A stub axle 18 upon which a wheel can be mounted extends transversely outward from each gear box 12 to be driven thereby. Each shaft 16 extends through a drive gear box 22 and is driven through the gear box 22 by an oil motor 24.



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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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Vehicles

This invention concerns improvements in or relating to vehicles and particularly but not exclusively skid steer vehicles.

Skid steer vehicles are vehicles in which each side of the vehicle can be driven independently of the other. For example, both sides can be driven in one direction; one side only can be driven in one direction; or one side can be driven in one direction whilst the other side is driven in the other direction. Such vehicles are extremely manoeuvrable. Examples of such vehicles are excavators, diggers, and loaders, and also military tanks. The vehicles may have wheels or tracks. It is vital with such vehicles that the axles on each side of the vehicle all turn at exactly the same speed to ensure that no skidding occurs.

Conventionally either individual motors are provided for each axle or a chain drive is provided to each axle from a central motor. The first arrangement is obviously relatively expensive and problems may be encountered with different motors turning at different speeds. With the second arrangement the chains have to be kept enclosed and regularly lubricated. Furthermore, chains tend to stretch and therefore regular maintenance as well as lubrication would be required.

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According to the present invention there is provided a vehicle comprising two longitudinally aligned drive shafts, one on each side of the vehicle, means for driving each shaft independently of the other, and means drivably connecting each axle on each side of the vehicle to the respective drive shaft such that all the axles on each respective side of the vehicle rotate at the same speed.

The axle connecting means preferably comprises a gear box, and desirably a bevel gear box. The drive shaft preferably extends into each gear box and mounts a gear wheel around its circumference engagable with the gear box. Each gear box preferably mounts an axle, and each axle is preferably mounted such that the weight borne by the shaft is borne through the gear box.

Each drive shaft is preferably driven via a drive gear box and each shaft may extend through a respective drive gear box with a gear wheel being mounted around the circumference of the shaft within the drive gear box. The drive gear box may be a reduction gear box.

A motor, which may be an oil motor, is preferably provided for each drive shaft and may be mounted on the drive gear box. All the gear boxes may be mounted on a single support member which is preferably substantially

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planar.

An embodiment of the present invention will now be described by way of example only with reference to the single figure of the accompanying drawing which shows a diagrammatic perspective view of part of a vehicle according to the invention.

The drawing shows part of a vehicle including a base plate 10. Mounted one towards each respective corner of the plate 10 are bevel gear boxes 12. The gear boxes 12 may be mounted for example by bolts 14 extending through the plate 10 from the underside thereof. A drive shaft 16 extends between the respective gear boxes 12 on each side of the plate 10. Only one shaft 16 has been shown in the drawing for clarity. The shaft 16 extends into the respective gear boxes 12 and mounts around its circumference adjacent its free ends a gear wheel (not shown) engagable with gears in the boxes 12.

A stub axle 18 extends transversely outwardly from each gear box 12 to be driven thereby and mounts a wheel hub 20 on its free end. The axle 18 is removably mounted to the gear box 12 by a large bolt (not shown) and has a hexagonal cross section. The axles 18 are also supported by the boxes 12 such that no wheel

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bearings are required.

The shaft 16 extends through a drive gear box 22 which is located substantially midway along the shaft 16. A gear wheel (not shown) is mounted around the circumference of the part of the shaft 16 located in the gear box 22 and is driveably connected thereto. Mounted on the side of the gear box 22 is an oil motor 24 with inlet and outlet pipes 26.

Obviously an identical arrangement is provided on the other side of the base plate 10. In use, the respective shaft or shafts 16 is rotated in a required direction by the or each motor 24 through the gear boxes 22. The drive is turned through 90° in each of the gear boxes 12 to turn the axles 18 and hence wheels 20.

There is thus described a relatively simple arrangement for providing drive on a skid steer vehicle. The simple arrangement of the apparatus enables relatively simple and quick assembly and also provides a very robust structure on the plate 10. The feature of the gear boxes 12 supporting the axles 18 eliminates the need for wheel bearings or other support arrangements. The axles 16 should be relatively maintenance free and do not require enclosure, unlike chains. The gear boxes 12, 22 would be oil filled and should thus require

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little maintenance.

Various modifications may be made without departing from the scope of the invention. For example, the drive gear box need not be a reduction gear box and drive could be provided other than by an oil motor. More than two axles could be provided along the side of the vehicle and in this instance the shaft could extend through an axle mounting gear box rather than terminating therein.

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Claims:-

1. A vehicle comprising two longitudinally aligned drive shafts, one on each side of the vehicle, means for driving each shaft independently of the other, and means drivably connecting each axle on each side of the vehicle to the respective drive shaft such that all the axles on each respective side of the vehicle rotate at the same speed.
2. A vehicle according to Claim 1, in which the axle connecting means comprises a gear box.
3. A vehicle according to Claim 2, in which the axle connecting means comprises a bevel gear box.
4. A vehicle according to Claims 2 or 3, in which the drive shaft extends into each gear box and mounts a gear wheel around its circumference engageable with the gear box.
5. A vehicle according to any of Claims 2 to 4, in which each gear box mounts an axle.
6. A vehicle according to Claim 5, in which each axle

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is mounted by the gear box such that the weight borne by the shaft is borne through the gear box.

7. A vehicle according to any of the preceding claims, in which each drive shaft is driven via a drive gear box.

8. A vehicle according to Claim 7, in which each drive shaft extends through a respective drive gear box with a gear wheel being mounted around the circumference of the shaft within the drive gear box.

9. A vehicle according to Claims 7 or 8, in which the drive gear box is a reduction gear box.

10. A vehicle according to any of the preceding claims, in which a motor is provided for each drive shaft.

11. A vehicle according to Claim 10, in which the motor is an oil motor.

12. A vehicle according to Claims 10 or 11 when dependent on any of Claims 7 to 9, in which the motor is mounted on the drive gear box.

13. A vehicle according to at least Claim 7 when

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dependent on at least Claim 2, in which all the gear boxes are mounted on a single support member.

14. A vehicle according to Claim 13, in which the support member is substantially planar.

15. A vehicle substantially as hereinbefore described with reference to the accompanying drawing.

16. Any novel subject matter or combination including novel subject matter disclosed in the foregoing specification or claims and/or shown in the drawings, whether or not within the scope of or relating to the same invention as any of the preceding claims.

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**Patents Act 1977**  
**Examiner's report to the Comptroller under**  
**Section 17 (The Search Report)**

Application number

GB 9225758.3

## Relevant Technical fields

(i) UK CI (Edition 1) B7H (HFG)

(ii) Int CI (Edition 5) B62D

## Search Examiner

PHIL THORPE

## Databases (see over)

(i) UK Patent Office

## Date of Search

23 FEBRUARY 1993

(ii)

## Documents considered relevant following a search in respect of claims

1-15

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2221518 A (SECRETARY FOR DEFENCE) see page 6 lines 4-21, Figure 1	1-5, 7, 10, 11
X	GB 1545352 (JACK ROAT) see whole document	1-6, 10, 11
X	GB 1459215 (SIREN) see page 3 lines 73-100, Figure 4	1-8, 10, 11
X	US 3659666 (FORSYTH) see column 4 lines 21-47, column 5 lines 9-20 Figure 9	1-8

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TP - doc99\fil000504

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Category	Identity of document and relevant passages	Relevant to claim(s)

#### Categories of documents

**X:** Document indicating lack of novelty or of inventive step.

**Y:** Document indicating lack of inventive step if combined with one or more other documents of the same category.

**A:** Document indicating technological background and/or state of the art.

**P:** Document published on or after the declared priority date but before the filing date of the present application.

**E:** Patent document published on or after, but with priority date earlier than, the filing date of the present application.

**&:** Member of the same patent family, corresponding document.

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